

### ABSTRACT OF THE INVENTION

A non-contact printed circuit board (PCB) electromagnetic testing system comprises at least one high resolution transducer operative to induce multi-frequency, multi-amplitude eddy currents in a tested PCB, each such transducer including both a high frequency excitation coil that serves also as a sensing coil and a direct current (DC) bias coil operative to provide an optimal transducer operating regime; a multi-frequency generator for providing AC and DC bias signals to each transducer; and a control mechanism for driving the transducer. Optionally, the system further comprises an external ferrite concentrator that enhances a magnetic field flux focus and depth of focus on the inspected PCB. The multi-frequency, multi-amplitude methods enable three-dimensional mapping of various features in the PCB with both high sensitivity and high resolution in respective operating regimes.